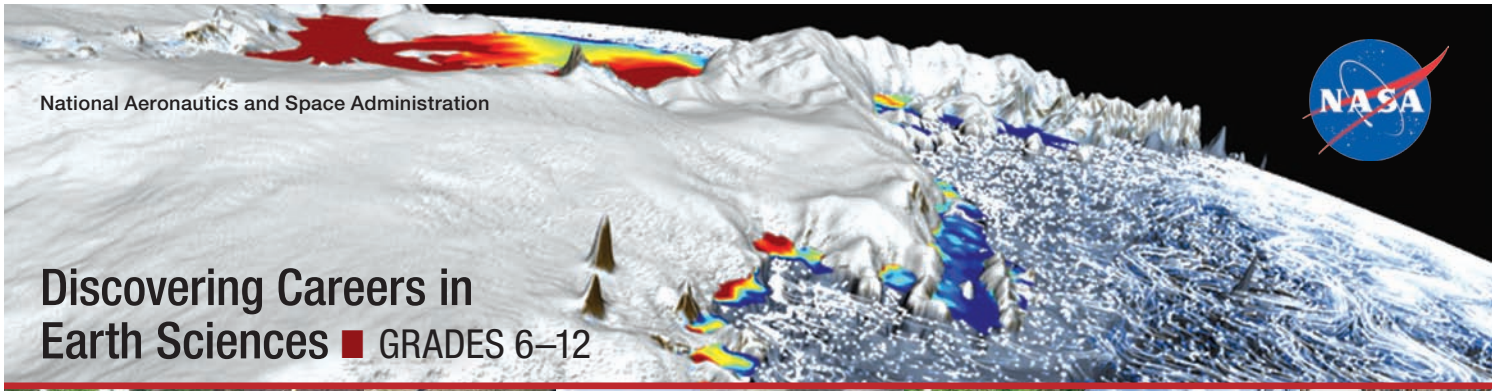


National Aeronautics and Space Administration

Discovering Careers in Earth Sciences ■ GRADES 6–12

For more than 50 years, NASA has provided us with unique views and knowledge of Earth. This is made possible by the contributions of thousands of scientists across the nation who study the interactions among its air, land, water, ice and life, and whose work paints a comprehensive picture of this complex planet we call home.

Earth Science Week 2012 celebrates the many exciting career paths in the geosciences field. With these resources in tow you and your students can discover firsthand accounts from many NASA Earth scientists as well as pick up classroom tools to bring real science into your classroom or science center.

Celebrate Earth Science Week 2012 with NASA!

To learn more about NASA resources and events planned for ESW and beyond:

http://climate.nasa.gov/esw2012

Top banner image: *Currents of Change—Data from NASA's IceBridge mission is used to map recent ice loss in Antarctica. Check out this visualization and more with the NASA Viz app. Source: NASA/Goddard Space Flight Center.*

MEET THE SCIENTISTS

Find out what these extreme Earth scientists are up to by exploring these articles, interviews and blogs.

GLOBE Scientist's Blog • http://bit.ly/ESW12_sciblog • In this online journal, scientists from the GLOBE educational program post their thoughts, comments and philosophies about a variety of science topics, such as climate and climate change. Students have the opportunity to share comments and discuss the topics with each other.

NASA EDGE • http://1.usa.gov/ESW12_edge • These videos and profiles offer a unique look at NASA through the eyes of its thousands of scientists. Check out: *Hurricane GRIP* • http://1.usa.gov/ESW12_grip • to learn about the NASA GRIP experiment team and how NASA is studying the development of tropical storms into hurricanes; *A-Train* • http://1.usa.gov/ESW12_train • to hear about NASA's Earth observations satellite constellation and how it gives us an unprecedented look at our planet's climate; and *DiscoverAQ* • http://1.usa.gov/ESW12_discover • to learn about monitoring air quality near the Earth's surface.

Operation IceBridge (OIB) • http://bit.ly/ESW12_oib • NASA's IceBridge mission, the largest airborne survey of Earth's polar ice, aims to study the rapidly changing features of the Greenland and Antarctic ice. Check out the OIB blog to learn more about a day in the life of these extreme scientists.

Other Blogs

My Big Fat Planet • http://1.usa.gov/ESW12_planet

Notes from the Field • http://1.usa.gov/ESW12_field

What on Earth • http://bit.ly/ESW12_earth

EARTH APPS & GAMES

Mission to Planet Earth • http://1.usa.gov/ESW12_mission • This online card game allows you to help prepare five NASA Earth missions, including Aqua, Terra and Aura.

NASA Apps • http://1.usa.gov/ESW12_apps • Find all the NASA apps for smartphones and tablets here, including *the* NASA App, with information on NASA's Earth and space science satellite missions, Astronomy Picture of the Day, video clips on current events, NASA Twitter feeds, and Third Rock Radio. Earth apps to check out include: *Earth NOW* • http://1.usa.gov/ESW12_earthnow • to see visualizations of Earth's vital signs as captured from NASA's fleet of satellites; *NASA Viz* • http://1.usa.gov/ESW12_viz • to have the latest research stories delivered to your iPad; *Satellite Insight: A GOES-R Game* • http://1.usa.gov/ESW12_insight • to help the GOES-R satellite manage massive inflows of data.

Where on Earth? Quizzes • http://1.usa.gov/ESW12_quizzes • Designed to inspire understanding of the physical, biological and human processes that influence our home planet, these quizzes allow you to become a geographical detective. A new image of an undisclosed region of Earth appears periodically. The challenge is to identify the location and answer a set of questions.

REAL SCIENCE FOR STUDENTS

GLOBE Student Climate Research Campaign (SCRC) • http://1.usa.gov/ESW12_scrc • This worldwide effort seeks to engage youth in understanding climate through research of locally relevant climate issues. It includes foundational activities, intensive observing periods, and research investigations. The campaign launched fall 2011 and concludes summer 2013.

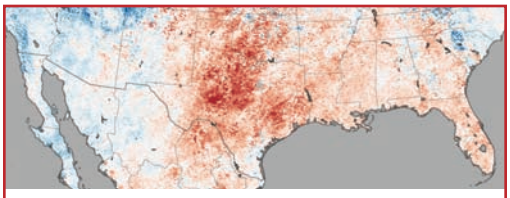
MY NASA DATA • http://bit.ly/ESW12_mnd • This portal allows students to investigate microsets of NASA Earth science satellite data, including atmosphere, biosphere, ice, ocean, and land surface data. Examples of lessons for middle and high school teaching include *Hurricanes as Heat Engines, Does Cloud Type Affect Rainfall?* and *How Does the Earth's Energy Budget Relate to Polar Ice?*

S'COOL—Students' Cloud Observations On-Line • http://bit.ly/ESW12_scool • This project involves students (ages 5–20+) in real science, making and reporting ground truth observations of clouds to assist in the validation of NASA's CERES satellite instruments. S'COOL observations contribute to the study of clouds and their role in our weather and climate.

EXPLORE EARTH WITH MULTIMEDIA

The Dynamic Earth • http://1.usa.gov/ESW12_dynamic • This 18-minute video, along with a glossary and related links available from the website, describes how NASA is observing our ever-changing planet.

NASA Earth Observatory • http://1.usa.gov/ESW12_eobs • This website features images, stories and discoveries from NASA Earth science research. Check out the section on *Natural Hazards* • http://1.usa.gov/ESW12_hazards • where you can browse images and subscribe to email updates on a wide variety of natural hazards.



Land Surface Temperature Anomaly in Texas: By April 2011, wildfires in Texas had burned more than 1.4 million acres. The image above is made with data from Terra's Moderate Resolution Imaging Spectroradiometer (MODIS) and shows high temperatures (in red), which contributed to hazardous fire conditions. *Source: Earth Observatory.*

NASA Global Climate Change • http://1.usa.gov/ESW12_climatechange • This website features a collection of climate news, visualizations, FAQ's, interactives and resources related to the changing climate and NASA's role in studying climate change. Check out the *Climate Reel* section • http://1.usa.gov/ESW12_reel • for a collection of NASA's best videos and visualizations of climate change. Interactives like the *Global Ice Viewer* allow you to see the changes taking place all over the planet.

NASA ScienceCasts • http://1.usa.gov/ESW12_scicast • These short videos cover fun, interesting and unusual science topics related to NASA's science missions. Subscribe to the free ScienceCasts on YouTube, iTunes and Vimeo, and follow on Twitter. Relevant topics include: *What Happened to All the Snow?* and *Power of Sea Salt.*

NASA Visible Earth • http://1.usa.gov/ESW12_visible • This website provides a searchable directory of NASA Earth science images, animations and data visualizations. Most resources are available digitally at multiple resolutions, with captions and metadata. Users can search the database using full text and advanced searches by topic, keyword, sensor, location, parameter and dates.

Science Bulletins: Earth • http://bit.ly/ESW12_bulletin • This bulletin presents ongoing research and recent discoveries in Earth science through features, data visualizations and weekly news snapshots. A free educator's guide and learning activities tailored to the changing content are provided from the Science Bulletins website.

FOR THE CLASSROOM

BIOLOGY

GLOBE: Land Cover/Biology Learning Activities • http://1.usa.gov/ESW12_globebio • These activities enable students to use remotely sensed data from the Landsat Thematic Mapper to create land cover classification maps.

CHEMISTRY

Aquarius Hands-On Lab Activities • http://bit.ly/ESW12_aquarius • These hands-on laboratory activities and demos are based on NASA's Aquarius mission. Resources for high school teaching include: *The Nature of Salt* • http://bit.ly/ESW12_salt • which looks at molecular compounds and ionic charges; *Electrolysis of Salt Water* • http://bit.ly/ESW12_saltwater • which explores the conductivity properties of salt water; and *Seawater Mixing and Sinking* • http://bit.ly/ESW12_mixing • which explores the effects of salinity and temperature on water density.

EARTH AND ENVIRONMENTAL SCIENCE

Blue Marble Matches • http://1.usa.gov/ESW12_marble • This activity introduces students to geologic processes on Earth and how to identify geologic features in images. Students also learn about how scientists use Earth to gain a better understanding of other planetary bodies in the solar system.

Earth Exploration Toolbook • http://bit.ly/ESW12_eet • This collection of online Earth system science activities introduces students to scientific data sets and analysis tools, including maps, graphs and images, as they explore some aspect of the Earth system. Activities include *Analyzing the Antarctic Ozone Hole, Investigating Precipitation-Streamflow Relationships, Exploring Regional Differences in Climate Change,* and more.

Meteorology: An Educator's Resource for Inquiry-Based Learning • http://1.usa.gov/ESW12_metguide • This resource includes inquiry-based activities to supplement existing middle school classes, including *Weather and Climate, Surface Color and Effect of Temperature Change, Tornado in a Box,* and more.

MATHEMATICS

Earth Math • http://bit.ly/ESW12_earthmath • This text explores mathematical concepts and processes involved in the study of Earth systems and global climate change, including unit conversion, significant figures, and creating linear equations. The application problems included allow students to quantitatively understand typical media reports about global climate change.

NASA E-Clips • http://1.usa.gov/ESW12_eclips • These short, relevant educational video segments inspire and engage students, helping them see real-world connections to NASA science. The ***Real World*** series for grades 6–8 features segments on topics such as *Abiotic Conditions* and *Earth System Science.* The ***Launchpad*** series for grades 9–12 includes segments on *Clouds and Earth's Radiation Budget, Systems Science,* and more.

NASA PUMAS • http://1.usa.gov/ESW12_pumas • The *Practical Uses of Math And Science* online journal is a collection of examples written by scientists, engineers and other experts that show how math and science topics taught in K–12 classes are used in everyday life. Examples for middle and high school teaching include: *What Is Wind Chill?, Earth Moves? Prove It!, Volcanic Clouds and the Atmosphere,* and *Ice Sheets and Sea Level Rise.*

Find these activities, lesson plans and books — and hundreds more!
www.smdeponews.org